

Name:

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University of Bahrain  
CE -- CIT -- UOB

**TEST 1 (28 April 2015) ITCE 444:  $\mu$ P-Based Design**

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Time: 60 minutes

31 May 2015

**Q1.** [30 marks]

If PORTC = 2, after running the following instructions, what will be the contents of WREG, PORTD and status flags?

```
ORG      0
SETF     TRISC
CLRF     TRISD
MOVF     PORTC, W
```

```
CALL      TABLE
MOVWF    PORTD
NEGF PORTD
```

```
TABLE :
MULLW    0x2
MOVFF    PRODL, WREG
ADDWF    PCL
RETLW    0
RETLW    1
RETLW    3
RETLW    5
RETLW    7
RETLW    9
RETLW    10
RETLW    13
END
```

PTO



**Q2.** [30 marks]

a) How long will it take to run the following procedure? Assume 8MHz clock :

```
R1    EQU    0X10
R2    EQU    0X11
R3    EQU    0X12
      ORG    0X1234
      MOVLW  2
      MOVWF  R1
      MOVLW  3
      MOVWF  R2
      MOVLW  4
      MOVWF  R3
LOOP: DEC     R3
      BNZ    LOOP
      DEC     R2
      BNZ    LOOP
      DEC     R1
      BNZ    LOOP
      HERE:  GOTO  HERE
```

b) Assemble the following two lines of the above program:  
**GOTO HERE** and the last **BNZ LOOP**

**Q3.** [ 40 marks]

Write a program to calculate Z in the following equation and save it in 0x200 :

$$Z = (A \times B + C \times D) + F$$

Where A, B, C, D and F are unsigned bytes at 0x100, 0x101, 0x102, 0x103 and 0x104